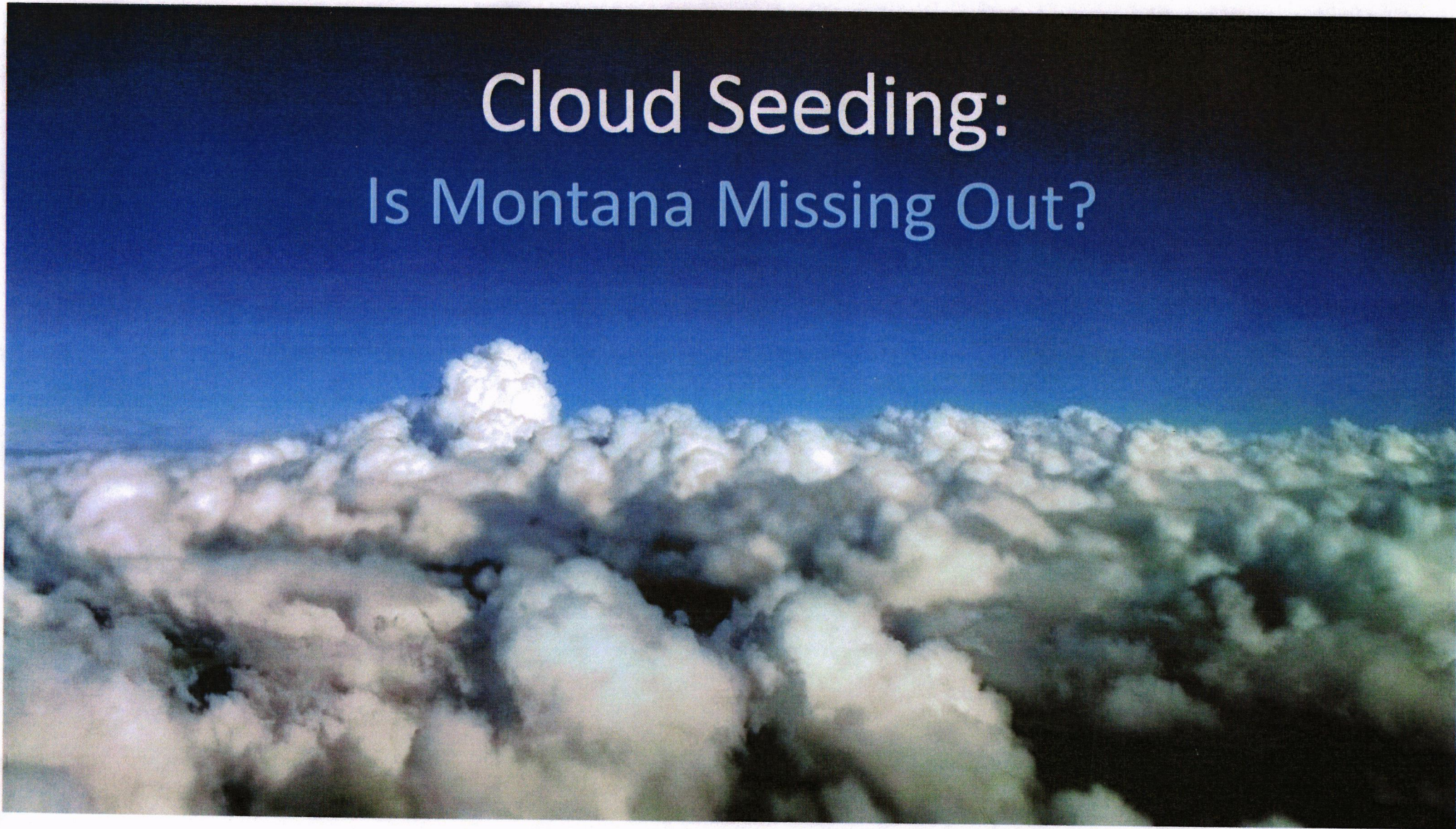
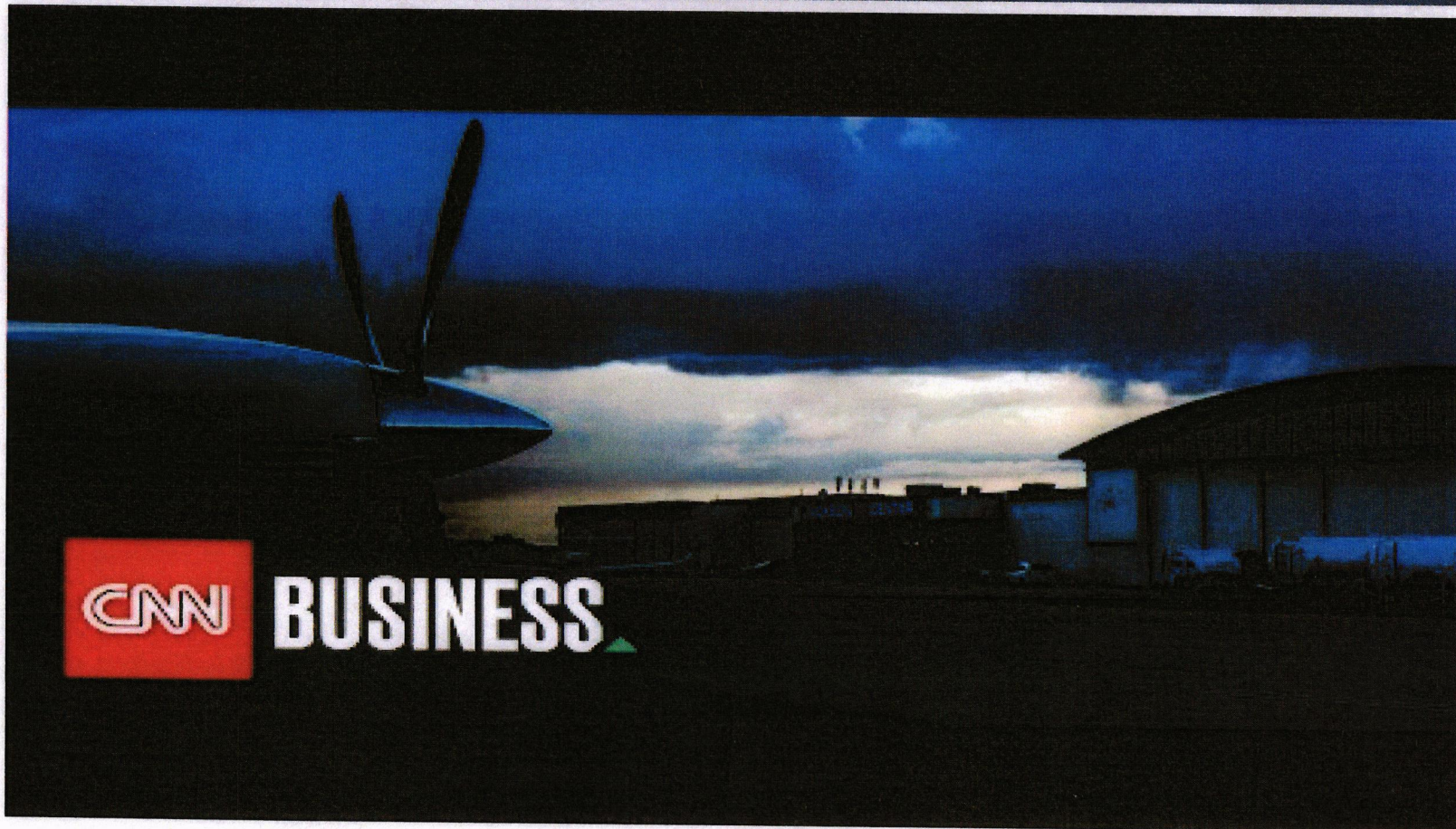


# Cloud Seeding: Is Montana Missing Out?

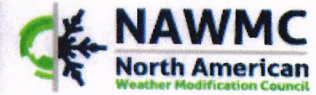




# Video: CNN Business on Cloud Seeding



# Cloud Seeding Definition

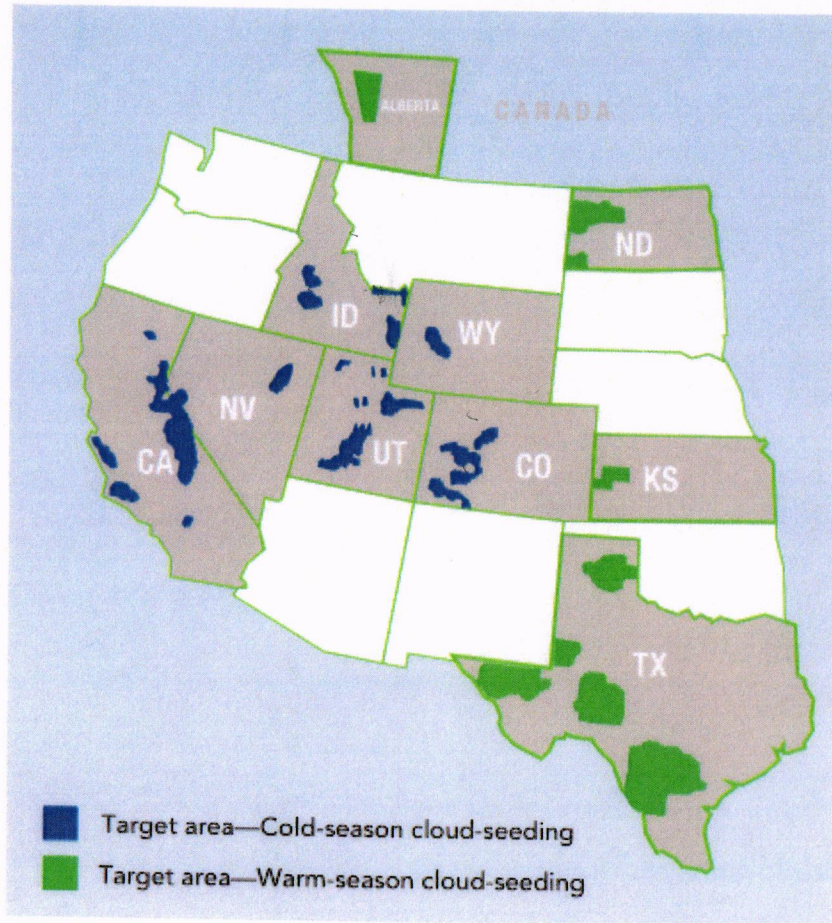
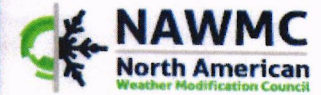


Cloud Seeding is a form of weather modification. It is a safe, scientific, time-tested and proven set of technologies used to *enhance rain and snow, reduce hail damage and alleviate fog.*

Cloud Seeding benefits are measured in additional water for all uses, and reduction of damage from severe weather. *It is used in both cold and warm season applications.*



# Cloud Seeding in North America



This map depicts site specific applications of Cloud Seeding in states and provinces in the Western United States and Canada.

Cold and warm season applications are differentiated for further information.



# Methods – By Air





# Methods – Generators

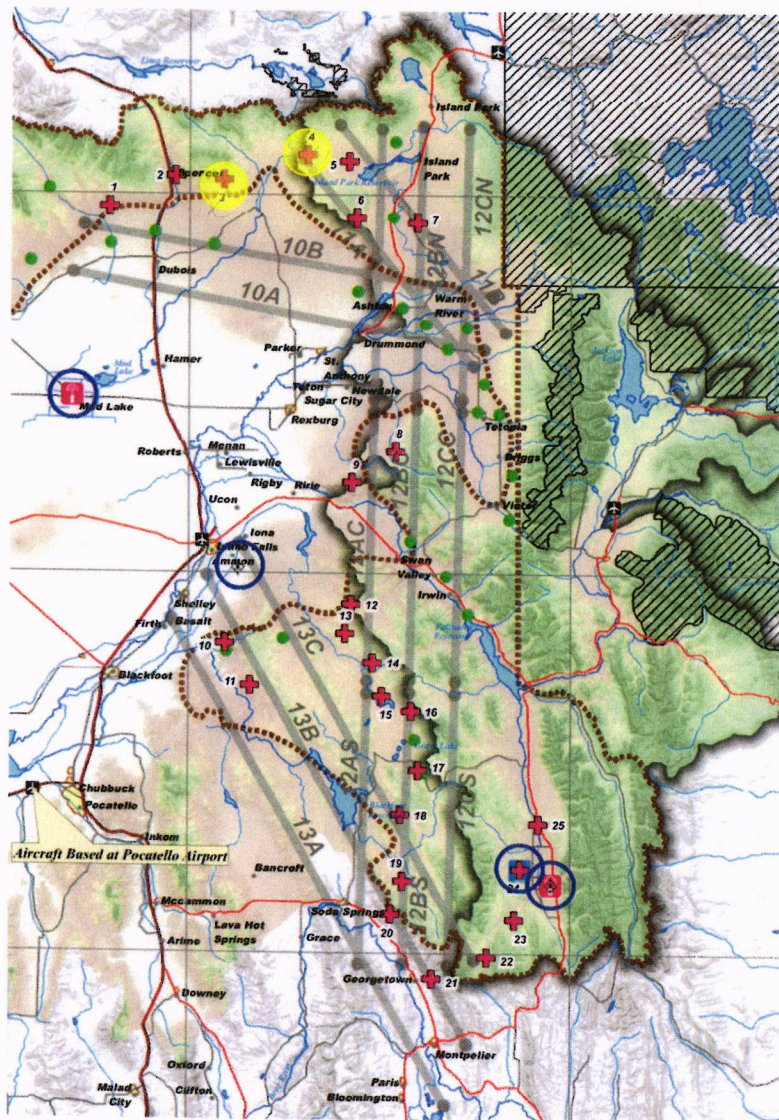
Remote



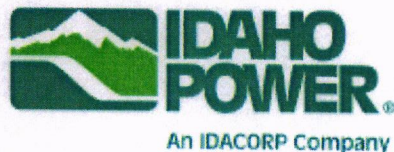
Manual







# Site Specific Project Map

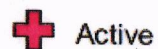


## USRB Project Map

Date: 11/5/2018

UTM, NAD83, Zone 12 Grid Coordinates

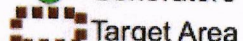
### Legend



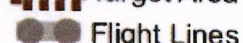
Active



Generators (Manual)



Target Area



Flight Lines



Met Tower



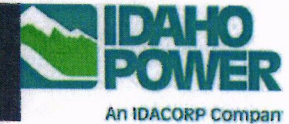
Radiometer



Rawinsonde



# Site Specific Project Results



## UPPER SNAKE RIVER VALLEY CLOUD SEEDING PROJECT

*Augmenting snow to increase surface and aquifer water supplies.*

Eastern Idaho's surface and ground water resources of the Snake River Basin have been stressed by drought, population growth, and increasing demands by agriculture, cities, and recreational activities. Severe drought conditions have reinforced the need to use all potential water management tools, including cloud seeding, to enhance the low water supplies.

Cloud Seeding programs include coordination and implementation of the project.

Over the last two seasons, the model shows that our collaborative project has resulted in an average of 125,000 acre feet of water reaching the Milner Dam (near Twin Falls), after all use in the Upper Snake River. That's about 1.5 Henry's Lakes of "extra" water with a value of \$2.5 million dollars

The project program by determining the placement of generators, conducting fund raising, developing budgets and approving costs, and monitoring the results of the project. The current operating budget is raised from 52 sponsors including cities, counties, water districts, conservation districts, local land owners, and private business; with major in-kind support from Idaho Power and the ID Water Resources Board.

Our 2015-2016 Cloud Seeding Season started November 1, 2015. The project includes 25 ground based generators and 25 remote controlled generators located in Bingham, Bonneville, Clark, Fremont, Madison, and Teton Idaho, and Teton Wyoming Counties. The generator locations are above 6,000 feet and placed to impact a target area in the mountains, down-wind from the generator.

Let it Snow, the project contractor based in Clark County, and Idaho Power Company monitor weather conditions including storm patterns, wind speeds, and cloud temperatures to determine when to turn specific generators on and off. Idaho Power provides a year end report, based on their new, state-of-the-art high resolution model. (See the report posted below)

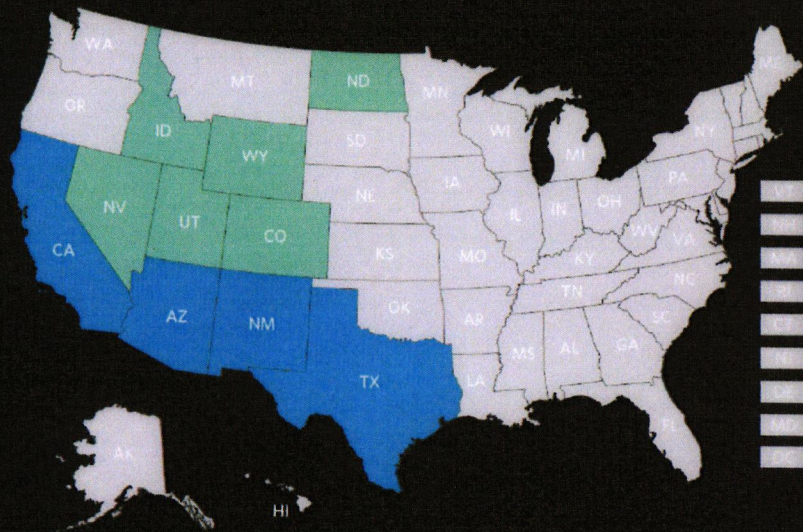
Over the last two seasons, the model shows that our collaborative project has resulted in an average of 125,000 acre feet of water reaching the Milner Dam (near Twin Falls), after all the use in the Upper Snake River. That about 1.5 Henry's Lakes of "extra" water with a value of \$2.5 million dollars.

This year the Collaborative will be piloting aircraft seeding. Model's show that adding aircraft could significantly increase the amount of snow generated, especially in the Clark County/Island Park Area. Aircraft seeding is significantly more expensive than ground based seeding. However, many storms can be seeded with aircraft that could not be seeded via the ground generators because of unfavorable conditions on the ground (too warm, too much wind, inversions). Idaho Power and ID Water Resources Board are providing the funding for the aircraft. We hope that the pilot shows that aircraft seeding will be economically feasible (cost vs. return on investment in "extra" snow).



## State Cloud Seeding Programs

States, water districts, ski resorts, power companies and irrigators are all trying to increase precipitation by using silver iodide to encourage ice crystals to form within clouds. The Central Arizona Water Conservation District and New Mexico Interstate Stream Commission fund cloud seeding in Rocky Mountain states.



- States without cloud seed funding
- Cloud seeding funded at the state and local levels
- Cloud seeding funded at the local level

Source: Weather Modification Association, Stateline research  
© 2018 The Pew Charitable Trusts

## State Programs

The adjacent map highlights states where Cloud Seeding programs are supported by private interests, and state and local entities.

Note: Canada's current cloud-seeding projects have a **\$3 million annual budget** which is funded by more than **20 of Alberta's top insurance firms**.

- States without cloud seed funding
- Cloud seeding funded at the state and local levels
- Cloud seeding funded at the local level



## Organizational Interest - Donations



- Fiscal Year 2015-2016: Idaho Organizations donated approximately **\$60,000** to the High Country Resource Conservation and Development Council's Cloud Seeding Project.

*This is considerable momentum, given the **\$120,000** received in the 7 years prior.*

- Current Operating Budget: Raised from **52 sponsors** including cities, counties, water districts, conservation districts, local land owners, and private business; with **major in-kind support from Idaho Power** and the **ID Water Resources Board**.
- The following slide is a list of donors for the HC RC&D Cloud Seeding Project demonstrating the **diversity of interest** in Cloud Seeding in the Upper Snake River Valley.



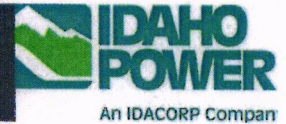
# Donor Organizations



|                                  |   |                                    |
|----------------------------------|---|------------------------------------|
| A&B Irrigation                   | Egin Bench Canals, Inc.                 | Madison County Farm Bureau         |
| Bannock County                   | Enterprise Irrigation District          | Madison SCD                        |
| Bingham County                   | Falls Irrigation District               | Marysville Irrigation Company      |
| Bingham Ground Water District    | Fall River Rural Electric Coop          | Minidoka SWCD                      |
| Birch Power Company              | Fremont County                          | New Sweden Irrigation District     |
| Bonneville County                | Fremont County Farm Bureau              | North Bingham SCD                  |
| Central Bingham SWCD             | Fremont County Snowmobile Club          | North Fork Protective Association  |
| City of Ammon                    | Fremont-Madison Irrigation District     | North Fremont Canal Systems, Inc.  |
| City of Arimo                    | Henry's Fork Foundation                 | North Side Canal Company           |
| City of Dubois                   | Henry's Lake Foundation                 | Place Farms Ltd.                   |
| City of Iona                     | Idaho Falls Power - City of Idaho Falls | Power County                       |
| City of Rexburg                  | Idaho Power Company                     | Progressive Irrigation District    |
| City of St. Anthony              | Idaho Irrigation District               | Reno Ditch Company                 |
| City of Sugar City               | Idaho Mountain Trading Co.              | South Bingham SCD                  |
| City of Victor                   | Jefferson Soil & Water Conservation     | Southwest Irrigation District      |
| Clark County                     | Jefferson Clark Ground Water District   | Teton Irrigation & Manufacture Co. |
| Clark County Water District 32-C | Jefferson County                        | Twin Falls Canal Company           |
| Clark Soil Conservation District | Jefferson County Farm Bureau            | Water District 1                   |
| East Cassia SWCD                 | Jerome County                           | West Side SWCD                     |
| East Side Soil District          | Madison County                          |                                    |



## Facts



### *Does Cloud Seeding in one area decrease precipitation in other areas?*

Research indicates that there is **no evidence that Cloud Seeding in one location causes a reduction in precipitation in neighboring areas**. During a storm a relatively small portion of the airborne water vapor falls to the ground as precipitation. Cloud Seeding increases that amount slightly, leaving most of the water vapor still present in the storm system. The additional precipitation that does fall is not lost from the water cycle.

Typically a **well-run Cloud Seeding program** **would affect less than 1 percent** of the water vapor in the atmosphere.



## Facts – A Technical Example

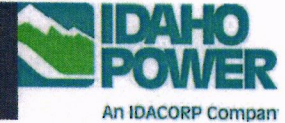


### *Does Cloud Seeding in one area decrease precipitation in other areas?*

- Research has shown neutral or positive effects from a well-run program
  - A well-run program only seeds clouds with an abundance of super cooled liquid water (SLW) at appropriate temperatures.
- To put quantities in context:
  - Nature will condense about 20% of water vapor as moist air rises over a mountain barrier (remaining 80% stays uncondensed)
  - Winter storms are typically 30% efficient, meaning that 30% of the 20% or 6% of the total, reaches the ground.
  - If Cloud Seeding increases precipitation 15%, that amounts to 15% of the 6%, or 0.9% of the total water vapor in the atmosphere.



# Facts



## *Is Cloud Seeding safe?*

Silver Iodide has been used as a seeding agent in numerous western states for decades without any known harmful effects. [Silver Iodide is insoluble in water](#) which is a characteristic that keeps it from having harmful effects.

As per the Weather Modification Association, published scientific literature clearly shows [no environmentally harmful effects](#) arising from Cloud Seeding with Silver Iodide aerosols have been observed, nor would be expected to occur. Based on this work, [the WMA finds that Silver Iodide is environmentally safe](#) as it is currently being used in the conduct of Cloud Seeding programs.

Additionally, [safety measures are employed](#) on Cloud Seeding projects in the U.S. These may include seeding [suspensions](#) in the event of specified snowpack thresholds, flooding potential, severe weather such as tornadoes or funnel clouds, and aircraft safety concerns such as severe icing or turbulence.



# Legislative History of Cloud Seeding in Montana



- 1967: 40<sup>th</sup> Legislature passed Montana's first Weather Modification and Control Act
- 1993: 53<sup>rd</sup> Legislature revised the Licensing and permitting process with SB72.
- 2003: 58<sup>th</sup> Legislature attempted to revise the licensing and permitting process through HB644, but it failed to pass in the Senate.
- 2005: 59<sup>th</sup> Legislature attempted to revise licensing and permitting process through HB399, but it also failed to pass in the Senate.
- 2017: 66<sup>th</sup> Legislature authorized HJ40 to study weather modification, which is currently being reviewed by the Water Policy Interim Committee.



# Legislative and Regulatory Challenges



The 1993 Legislation (SB72) essentially eliminated Cloud Seeding in Montana by requiring:

- A full Environmental Impact Statement (EIS)
- Requiring both licensing and permitting annually
- Robust local public meeting requirements
- Bonding or insurance of \$10,000,000
- No Cloud Seeding by other states permitted within Montana
- A permit fee of 1% of the project cost



## Next Steps for Montana

- **Education** of legislators, state agencies, potential users and the public.
- **Develop and pass legislation** with appropriate changes that support Cloud Seeding in Montana.
- **Encourage** potential **user groups** to seek out weather modification expertise to develop Cloud Seeding applications in designated areas.

Examples of user group resources are:


- North American Weather Modification Council (NAWMC)
- Weather Modification Association
- Idaho Power
- American Society of Civil Engineers



# What is there to gain for Montana?

- Ability to increase untapped precipitation through Weather Modification.
- 30 years of advancements that can be immediately utilized at no expense to Montana.
- Resources available to identify potential site specific applications.
- Opportunities to collaborate with neighboring states with established programs.
- Increased yield from our watersheds as the value of water increases, benefiting all stake holders.
- Potential to mitigate property and crop damage from hail.



A photograph of a winter landscape. In the foreground, a snow-covered road curves through a field of snow. To the left of the road is a dense forest of evergreen trees covered in snow. In the background, a large, snow-covered mountain rises, its peaks partially obscured by clouds. The sky is filled with dramatic, colorful clouds in shades of blue, white, and yellow, suggesting a sunset or sunrise. The word "Questions?" is overlaid in the center of the image.

Questions?